

How Big Was the Soviet GDP?*

Abram Bergson

Harvard University

With the recent completion of calculations for 1990, the multilateral program for compiling comparative GDP estimates that was initiated in the 1970's has now been extended to the USSR, and provides a fresh perspective on the dimensions of that country's economy. This essay assesses summarily the measures that have been compiled for the USSR, comparing them with the controversial CIA data.

Introduction

The Soviet Union is no more, but the comparative level and structure of its GDP retain historical interest. Their accurate measurement is also basic to a proper understanding of the latest, i.e. post-fall economic trends.

It is much to the good, therefore, that in judging this matter we can now refer to result of a major inquiry that was undertaken as part of the European Comparison program (ECP), an offshoot of the so-called International Comparison project (ICP). Under the sponsorship of the United Nations, that project has now been generating comparative measures of GDP for more than a quarter of a century.

I try here to assess summarily the ECP calculations as they relate to the USSR. It is of particular interest, inevitably, to consider how such measurements compare with the proverbially controversial but still much cited ones of the CIA.¹ While the Soviet Union no longer exists, it still existed in 1990. Indeed, it did not effectively expire until December 25, 1991, when Mikhail Gorbachev resigned as its President. The year 1990, though, was a troubled one economically, and to a degree that was also true of the entire period from March 11, 1985, when Gorbachev became Party General Secretary. There is thus no reason to challenge seriously the CIA estimates indicating that in 1990 the Soviet economy was already in decline relatively to that of the USA,

* I have benefited from comments of anonymous referees.

and even absolutely.² These facts should be borne in mind, for the ECP calculations considered relate to that year, and for comparison I cite similarly dated ones of the CIA.

The CIA Estimates

The CIA calculations are broadly familiar. Focusing particularly on the relation of Soviet to U.S. output, the agency initially computes each country's aggregate product in "national," i.e., its own prices, and then translates that magnitude in terms of the prices of the other country. The translation is sometimes accomplished by reference to measures of relative physical volume of one or another output component, but most often reference is made rather to ruble-dollar price ratios, in effect, so-called purchasing power parities (PPP's) compiled for different components.

Such calculations yield not one measure of comparative total output but two, one in ruble prices and the other in dollar prices. The CIA, as well known, finally averages the measures to obtain a single figure.³

While the calculations culminate in a measure for total output, the aggregates national prices from which they began are broken down by final use, and the needed translations and averaging proceed accordingly. Thus, along with a measure of relative total output in the USSR and USA, the computations generate comparative measures, much of interest in themselves, on different final uses. The CIA's results for total output and a major final use, household consumption, are shown (Table 1) for 1990, the year on which ECP focuses.⁴

Granting the preoccupation with the USSR and the USA, the CIA itself is proceeding here much as has come to be done in the West, in the compilation of comparative national output data, under the International Comparison Program (ICP). Wherefore, then, the controversy in respect of the CIA's measures?

Criticism of the CIA computations has been varied, but a principal charge is that the CIA has failed to allow sufficiently for differences in quality of goods and services in the USSR and USA. The CIA clearly devoted a considerable effort to dealing with such differences. In compiling ruble-dollar price ratios, for example, for some 20 processed foods and nearly all the non-food consumers' goods considered, the necessary matching of Soviet and U.S. products was accomplished only after the importation of the Soviet products and their evaluation in light of US expert advice.⁵ In the computation

TABLE 1
Comparative GDP and Consumption, USSR and
USA, 1990.
 (USA = 100)

	GDP	GDP per capita	Consumption per capita
CIA	49	43	31
CIA, discounted	44	38	28
ECP	36	32	24

Sources: For CIA, data in CIA (1991, p. 36) on "GNP" and "consumption" slightly adjusted to conform to ECP population figures. On CIA GNP vs GDP and CIA, discounted, see text and n. 4. For ECP, see the data on "real value" for GDP and "final national consumption" and "individual consumption by households" in United Nations Statistical Commission *et al.*, (1994), pp. 32, 61, 67, 69; OECD (1992), PP. 23, 27, 66.

of comparative national output, however, quality differences can pose a formidable problem even among similar economies, and the Soviet and U.S. economies are hardly similar. With all the pains that the CIA has taken, as it has long acknowledged, it achieved only a partial success in grappling with this matter. Soviet products treated as comparable to those of the USA are admittedly often, in one way or another, inferior to the latter.

The resulting bias in favor of the USSR, as readily seen, is only compounded insofar as the calculations unavoidably entail a kind of sampling even within relatively detailed final use categories; unavoidably, too, the varieties covered in the sampling process tend to be more representative of the Soviet than of the US product mix. Indeed a good many high quality commodities found in the USA are not produced in the USSR at all.

The "CIA, discounted," data on GDP and consumption that have been tabulated (Table 1) result from applying to the CIA estimates a discount of ten percent (per cent, not percentage points). Discounting the CIA estimates "perhaps by as much as 10 per cent" has been held by the CIA itself to be needed to allow for qualitative deficiencies in Soviet output that were insuf-

ficiently allowed for in the CIA's calculations. Such a discount is apparently called for in respect of the CIA's measure not only of GDP but also that of a major final use such as household consumption (CIA, 1990 A; Schroeder, 1990).

The correction came late in the day, but even if it had appeared earlier, it could not have silenced critics of the CIA calculations, who uniformly have seen the overstatement as larger, sometimes much larger, than the CIA allows. Rather than 10 per cent, seemingly a discount of as much as three-fifths has been indicated by one critic. While the thrust of the criticism is clear enough, however, attempts at independent quantification have been found to be defective. A considerable critical literature, thus, seems only to invite further inquiry.⁶

European Comparison Program (ECP) Estimates

Enter the ECP. Itself an offshoot of the International Comparison Project (ICP) with similar multilateral sponsorship, its calculations methodologically are essentially such as have been compiled under that project. They, thus, also have much in common methodologically with those of the CIA, which in its own work, as explained, was apparently much influenced by the International Comparison Project. The results, however, are rather otherwise, with total output and consumption falling below even the discounted CIA estimates (Table 1). The shortfall though, is not as large as some criticisms suggested.⁷ How to view this outcome? What particularly of the treatment of quality differences by ECP? Are the results at long last free of incongruities such as those that have affected the CIA's calculations?

For two such differing economies as those of the USSR and USA, that would be a remarkable achievement for the ECP, and the difficulties only seem underscored when one expressly confronts, as the ECP does, the two disparate desiderata that must be sought. in the selection of "items," i.e., products, within different "basic headings" or product categories that are to be considered in the calculations: on the one hand, for any item, "comparability" between countries, and on the other, "representativeness" of the items selected in each basic heading, for each country separately. The two desiderata need not conflict with each other, but especially in comparing structurally very different economies they are obviously apt to do so.⁸

In practice, then, as the ECP acknowledges, there must again and again be a "trade off," with greater conformity to one desideratum being achieved at the expense of less conformity to the other. But granting the inevitable limita-

tions, ECP, I think, may well have been able to cope more effectively with the quality problem than the CIA could.

To understand why, we must consider that the CIA has been preoccupied with relative Soviet and US performance, and hence limits itself to a bilateral comparison of those two countries. For the ECP, however, the USSR is but one of a number of former communist countries (FCC's) to be considered,⁹ and all alike are juxtaposed with numerous western countries in a multilateral comparison.

While that is of interest in itself, more in point now is the fact that one of these countries, Austria, has come to be used by ECP as a "bridge" country, mediating all comparisons alike between FCC's and Western countries generally. The ECP is not entirely explicit about its reasons for proceeding in this way, but, as well as being geographically proximate to the FCC's, Austria has a per capita GDP that is at an intermediate level among the different countries, Eastern and Western, considered. If only on that account, the use of Austria as a bridge country might by itself have facilitated grappling with quality differences. But a corollary was the use of the Austrian Central Statistical Office (CSO) as a key participant in that work, with major responsibilities for the selection of possible products for study, and for monitoring, partly through the exchange of expert visits, of the actual choices made, including inevitable substitutions and price adjustments.

There is every indication in the summary report of the ECP (United Nations Statistical Commission, *et.al.*, 1994) and a related working paper (Alfred Franz, 1994) that the Austrian CSO did not take these responsibilities lightly. It should also be noted that Austria was not for the first time serving as a bridge country between East and West. While the USSR only began to be included in ECP estimates with calculations for 1990, other FCC's had already been covered in such calculations for earlier years. The Austrian CSO, thus, must have acquired a good deal of relevant knowledge regarding FCC outputs and prices.¹⁰ It goes without saying that the study must also have benefited from the fact that the relation between the Austrian CSO and the FCC's has clearly been of a collaborative sort rather than a confrontational one such as for the CIA.¹¹

Whatever the advantages of the ECP, the degree of conformity it could achieve to its desiderata had to depend to a degree on the number of basic headings and items it considered. It should be noted, therefore, that under ECP some 301 basic headings were considered for an FCC, or somewhat more than for a Western country. In respect of the Soviet Union, these headings were represented by some 861 items, or 623 items for consumers' goods

alone (United Nations Statistical Commission, *et al.*, 1994, pp. 17-18; Franz, 1994, Annex Table 1). The CIA has not published any comparable data for its study, but probably neither inquiry scores consequentially at this point (on the CIA, Imogene Edwards *et al.*, 1979, pp. 395 ff; Schroeder and Edwards, 1982).

Granting the advantages of ECP, to repeat, incongruities in its calculations were still unavoidable and the inevitable question is whether, as for the CIA, there is any systematic bias in one direction or the other. If there is, that is difficult to discern, but some further comment is called for on the always troubling "comparison resistant services," i.e., services such as education and health care that are supplied to some extent in the West and predominantly in FCC's in an extra-market way as public goods.

The ECP with some basis rejects for these goods the conventional expedient that the CIA adopted, according to which labor engaged in providing extra-market services is taken to be equally productive in the FCC's and the West. In other familiar words "a doctor is a doctor" and renders the same or equivalent service in all countries alike.

Among alternative procedures adopted by the ECP for such services for FCC's, however, one entails equating output per worker there with that in the same country's market sectors. That would seem rather at odds with indications that labor productivity, in low income countries, while in general relatively low, is less so for non-tradables than for tradables. In adopting the indicated expedient, the ECP may have overcorrected for the FCC quality deficiency.

As implied, ECP takes productivity in market sectors as a benchmark for that in the non-tradable sphere in the case of FCC's but not for other countries. Hence any correction at this point would tend to distort comparative output in FCC's relatively to that elsewhere.

Any consequential understatement of Soviet Output at this point, nevertheless, seems unlikely when we consider that the ECP apparently still assigns a relatively high PPP to rubles spent on such major extra-market services as education and health care. Thus, relatively to the overall PPP for the GDP, such rubles are valued more highly in Austrian schillings than the corresponding Turkish drachmas, though Turkey has an even lower GDP per capita than the USSR (Table 2). As might be expected, relatively to the overall GDP PPP rate such rubles are also valued well above the currencies of Portugal and Spain, two countries with a GDP per capita well above that of the USSR.¹²

TABLE 2

PPP's in Foreign Currency per Austrian Schilling, for Education and Health Care, Relative to GDP, Selected Countries

(PPP for GDP = 100.0)

	USSR	Turkey	Portugal	Spain
GDP	100.0	100.0	100.0	100.0
Medical care	45.9	77.6	104.7	98.0
Education	33.5	57.7	64.4	68.8

Source: United Nations Statistical Commission *et. al.* (1994, pp. 64-65)

Conclusions

In 1990, the penultimate year of Gorbachev's perestroika, the USSR produced a per capita GDP that was 43 per cent of that of the USA. Correspondingly Soviet households consumed 31 per cent as much per capita as U.S. households did. Or so the CIA has reported, but its findings have often been challenged, and early on the CIA itself acknowledged that its calculations were affected by a systematic error. Because of insufficient allowance for Soviet quality deficiencies, the estimates avowedly overstated Soviet performance. As the CIA has put it more recently they are to be discounted "perhaps by as much as 10 per cent" (not percentage points). That discount, however, may not be large enough. According to a recently published study of the European Comparison Program (ECP), an offshoot of the well known International Comparison Project, Soviet GDP per capita in 1990 was but 36 per cent of that of the USA, or below the CIA estimate even after the indicated discounting. At 24 per cent of the USA level, the ECP similarly finds Soviet household consumption per capita below the discounted level that the CIA came to allow. In its calculations, the CIA apparently exerted quite an effort to grapple with the critical problem posed by product quality differences in the two economies. As the ECP acknowledges its calculations too have their limitations. But its internationally organized inquiry may have been able to improve on the CIA performance as a result of the use of Austria as a

“bridge country” and the associated coordinating role of the Austrian Central Statistical Office. In this work, the Austrian CSO apparently had the cooperation of its counterparts in the FCC’s. Such a relation with the Soviet central statistical office was needless to say beyond the reach of the CIA.

So much for the comparative CIA and ECP findings on GDP and household consumption, a major final use of GDP. Both the CIA and ECP calculate GDP by final use more generally, but the CIA has published only incomplete results of this exercise, while the ECP for its part has apparently been wary of releasing data on defense. Substantially comparable data from the two calculations are available, however, for one other, by no means unimportant, final use.

I show below, for gross fixed investment, ratios of Soviet to U.S. per capita volume corresponding to those that have been cited for GDP and household consumption.¹³

USSR/USA (percent)	
CIA	79
CIA, discounted	71
ECP	55

As long understood, investment had a central place in Soviet policy on growth. Its comparative volume correspondingly has long been a matter of particular interest to students of the Soviet economy. Measures of it inevitably have also drawn their share of controversy. The cited figures provide further perspective on this cardinal aspect.

According to ECP calculations, the CIA apparently overstates Soviet investment volume as it overstates Soviet GDP generally, but to a somewhat greater extent. Thus, while for ECP the Soviet GDP is 75 per cent of the CIA estimate, the corresponding figure for fixed investment is 70 percent. Even after the downward correction thus indicated, however, Soviet fixed investment at 32 per cent of the GDP remains inordinately large.¹⁴

While CIA estimates of comparative Soviet output have been controversial generally, they have been notably so for those on defense. It is much to be

regretted, therefore, that the ECP has not published its findings on this matter. Defense outlays, however, must be by far the predominant element in "collective consumption of government," the end use in which defense is classified. It is thus of interest that, as calculated by ECP, such consumption per capita comes to 47 per cent of that of the USA. That is certainly an impressive figure, but, as calculated by ECP, defense must be well below the CIA estimate. It must be considered, though, that at 107 billion rubles the ECP's "collective consumption of government" is probably well below the corresponding CIA estimate in current ruble prices. That could signify among other things that for the ECP defense is less inclusive than for the CIA.¹⁵

The contrast between CIA and ECP measures of comparative Soviet and U.S. real economic volume is of much interest, and has properly been the focus of attention here. But ECP provides illuminating data on comparative real economic volume in the USSR and the West more generally. While this matter cannot really be pursued, it should be noted that in 1990 after 12 five-year plans, the USSR was found to have a lower GDP per capita than that of any OECD country except Turkey. Per capita consumption in the USSR is similarly depressed by OECD standards, and indeed only barely exceeds that of Turkey. In respect to per capita investment volume, it compares well enough with several lower level OECD countries (Ireland, Portugal, Greece and Turkey). But, according to ECP calculations, it no longer rivals numerous relatively advanced Western countries as it has long been supposed to do. The conventional view, inspired in part by CIA calculations, of the USSR as a super-star in generating investment volume, apparently requires some revision.

As indicated, the ECP study also extends to a number of FCC's: Czechoslovakia, Hungary, Yugoslavia, Poland and Romania. Among these, the USSR surpasses all but Czechoslovakia regarding GDP per capita. Regarding per capita consumption, however, it is surpassed also by Hungary and Yugoslavia. It surpasses all other FCC's alike regarding per capita investment volume.

In compiling comparative data on national income, both the CIA and the ECP are seeking to measure "real" volume, that being understood in the usual way as representing comparative output volume at "constant" prices, i.e., prices that are the same as between countries. Such calculations, however, are often taken as more or less indicative of more ultimate theoretic categories, specifically "production potential" and "welfare." May the CIA and ECP measure be construed correspondingly?

As is customarily done in the compilation of comparative country data on national income, the CIA and ECP essentially leave their deeper economic

meaning to separate inquiry. The result is a deficiency that can not be repaired here, but the reader is reminded that prices in FCC's have traditionally left much to be desired theoretically. That must still have been true in 1990, the year considered here for both the CIA and ECP calculations. The calculations must be viewed accordingly.¹⁶

Notes

1. While published in 1994, the ECP calculations curiously appear as yet to have been accorded remarkably little notice. They are drawn on, however, in Angus Maddison (1995), and are referred to briefly in Gertrude Schroeder (1995).
2. As calculated by the CIA (1991, p. 30), GNP per capita in the USSR, relatively to that in the USA, was in 1990 some four percentage points below the 1985 level. On the 1990 experience: CIA (1991, p. 35); James Noren and Laurie Kurtzweg, (1993), and below n
3. Since the average is calculated geometrically, the result corresponds to the famous "Ideal Index" of Irving Fisher.
4. For comparison below with ECP data, CIA measures relating to gross national product (GNP) are taken, I think with little error, to relate to gross domestic product (GDP) as well. The net factor income from abroad that supposedly is included in GNP (though not in GDP) is in the CIA calculations apparently accounted for as part of a multi-component residual. Judging from incomplete information, reference to GDP instead of GNP might be to the USA's advantage, though perhaps by no more than a half of one percentage point: see IMF (1992); CIA (1991, p. 34); Council of Economic Advisors (1995, pp. 274, 394). It should also be noted that, contrary to usual practice, the CIA values output in terms not of the prices of the reference year, 1990, but of another year, 1982 (CIA 1991, p. 36). Applying familiar index number principles, I judge that the relative Soviet GNP might be, say, one or two percentage points less if evaluation instead had been in 1990 prices. Compare Abraham C. Becker (1994, 307 ff).
5. On the treatment of quality in the CIA calculations and on the calculations more generally: Imogene Edwards, *et al.*, (1979); Schroeder and Edwards (1981); on the criticism, see below.
6. On the literature in question: Abram Bergson (1991); Becker (1990); James R. Millar, *et al.*, (1993).
7. The ECP strictly speaking refers only to Europe, but we can draw as needed on related work extending measurements to non-European OECD countries, including the USA. I shall often refer elliptically to the ECP to include the related work. On the latter, see the sources for Table 1.
8. Note that, as is usual with the ICP, PPP's are aggregated within basic headings without expenditure weights. Such weights are applied, however, at higher levels of aggregation. On this matter and on ECP methodology more generally: United Nations Statistical Commission, *et al.*, (1994, pp. 13 ff); Alfred Franz (1985, 1994).
9. On the countries in question, see below. I shall refer to such a country as a "former

communist country" (FCC; plural, FCC's), though all but one was still more or less communist in 1990, the year studied.

10. The ECP calculations themselves date back only to 1980, but ICP was already functioning then, and had compiled data for several FCC's reaching back to 1975, and, in the case of Hungary, to 1967. Curiously when results for earlier years are extrapolated from 1975, they tend to be higher than those for 1990, though to a degree that diminishes as the year considered approaches 1990. For Poland, for example, these are the extrapolations of GDP per capita for the calculation years 1975, 1980, 1985, together with the actual ICP result for 1990: 31, 28, 20, and 23. Corresponding measures for Hungary are 43, 35, 30 and 29 (Maddison, 1995, p. 174). Why should this be? Extrapolations such as in question are unavoidably subject to error, and discrepancies between extrapolated and actual ICP measures are not surprisingly observed among countries studied, both Eastern and Western, generally. But less usual are the diminishing discrepancies such as for Poland and Hungary, and one must wonder whether the increasing ECP know-how referred to has not been a factor. Interestingly, the ECP apparently found particularly instructive the experience of FCC's as their domestic products had to compete increasingly with western goods under on-going reforms (United Nations Statistical Commission *et al.*, 1994, p.19)

11. Use of Austria as a bridge country, as indicated, was the ECP's way of integrating FCC's in a multilateral comparison of GDP's. For that comparison, it should also be noted, the ECP does not limit itself simply to a collection of bilateral measures. Rather it proceeds, as has become customary in ICP, by applying a multilateral index number formula, in which all countries considered are simultaneously scaled against each other. That, in principle, could be a consequential source of difference from the CIA in respect of comparative Soviet-USA performance. But as noted above, the CIA applies the Fisher index number formula. As for the ECP, it applies the so-called "EKS" formula. That is the counterpart, for the multilateral case, of the Fisher index. With Austria as a bridge country, moreover, the resultant "multilateralization" apparently is only partial (see United Nations Statistical Commission *et al.*, 1994, pp. 10, 25-28). The resulting measures of GDP and consumption for the USSR in any event would be still somewhat lower - by 3.5 and 2.9 per cent respectively - if the comparison with Austria were of a purely Fisher type (*ibid.*, pp. 28, 71, 76). More generally, for a wide range of income levels, multilateral measures given by the EKS formula have been found to differ erratically, but most often to only a very limited extent, from the corresponding comparison with the USA given by the Fisher index. See Irving B. Kravis, *et. al.* (1982, pp. 96-97). In this essay, we are interested in not only GDP but its final uses, and, as may as well be noted, EKS suffers from a limitation from that standpoint: the sum of final uses as given by EKS cannot be expected precisely to equal the corresponding total obtained for the GDP. Awkwardly structural relations have to be read accordingly, but for the two countries of particular interest here and for major headings as they relate to the GDP, the resultant divergence is small. Thus the aggregate of major headings for the USA falls short of the indicated GDP by 0.6 per cent and for the USSR exceeds the indicated GDP by 2.8 per cent: see United Nations Statistical Commission *et. al.* (1994, p.67); OECD (1992, p.23).

12. Awkwardly, the PPP's in question relate to not only labor services in the outlay categories in question, but labor services together with accompanying non-labor expenditures. The relatively high value of the ruble in medical care and education thus could to a degree reflect relatively low levels of such non-labor outlays with low values of the ruble. On comparative productivity in tradables and non-tradables, the relevant literature is voluminous; it may suffice here to cite Kravis, *et al.*, (1982, ch. 5); Bela Balassa (1964).
13. For the CIA, aggregate volume of "new fixed investment" is extrapolated here from the estimate for 1989 in CIA (1990 C., p. 38) by allowing for a 6 per cent decline in 1990 (see Noren and Kurtzweg, 1993, p. 17). A corresponding per capita estimate is obtained by reference to population data in the UN and OECD sources for Table 1. For ECP, the "real value" per capita of "gross fixed capital formation" is indicated by data in these sources. As the CIA explains, it incorporates in "new fixed investment" some expenditures that in the USSR are classified as "capital repair." In ECP such outlays apparently are for the most part included in "gross fixed capital formation."
14. I referred above (no.11) to the "non-additivity" that is encountered under EKS. The non-additivity is especially marked for gross fixed investment, but in the upshot such outlays are only the greater when calculated as a sum of components. Taken as an aggregate of "construction" and "machinery and equipment" outlays, gross fixed investment is 18 percent greater than the corresponding category indicated directly by EKS (United Nations Statistical Commission *et. al.*, 1994, pp. 68-69).
15. On relevant ECP calculations, see the sources for Table 1; on the CIA, Noren (1995). On implications for relative USSR-USA defense outlays, compare Schroeder (1995, p. 216).
16. The nature of the "constant" prices in terms of which comparative data are compiled must depend, of course, on the procedure used to aggregate PPP's for different products. As indicated (notes 3; 11), CIA and ECP diverge at this point, but this too is a matter that is best left to be pursued elsewhere. On theoretic interpretation of "real" national income data: Bergson (1953, ch. 3, 1961, ch. 8).

References

Balassa, Bela, 1964. "The Purchasing Power Parity Doctrine: A Reappraisal," *Journal of Political Economy* 72, December, 584-596.

Becker, Abraham C., 1994. "Intelligence Fiasco or Reasoned Accounting?," *Post-Soviet Affairs*, 4, Oct.-Dec. 291-329.

Bergson, Abram, 1991. "The USSR before the Fall: How Poor and Why", *Journal of Economic Perspectives*, 4, Fall, 29-44.

CIA, 1990A. "The Soviet Economy Stumbles Badly in 1989", presented to the Joint Economic Committee, U.S. Congress, April 20.

CIA, 1990B. *Measures of Soviet Gross National Product in 1982 Prices*. Washington, D.C.: CIA..

CIA, 1990C. *Handbook of Economic Statistics. 1990*. Washington, D.C.: CIA.

CIA, 1991. *Handbook of Economic Statistics. 1991*. Washington, D.C.: CIA.

Council of Economic Advisers, 1995. *Economic Report of the President*, Washington, D.C.: GPO.

Edwards, Imogene *et al.*, 1979. "U.S. and USSR: Comparison of GNP", in Joint Economic Committee, United States Congress, *Soviet Economy in a Time of Change*, Washington, D.C.: GPO.

Franz, Alfred, 1985. "The solution of problems in international comparison of GNP through price adjustments", *Statistical Journal of the United Nations*, 3, 307-319.

Franz, Alfred, 1994 "Searching for Comparability", Austrian Central Statistical Office, *Working Paper*, No. 6, Vienna: March.

International Monetary Fund, 1992. *The Economy of the Former Soviet Union in 1991*, Washington D.C.: International Monetary Fund.

Kravis, Irving B. *et al.*, 1982 *World Product and Income*, Baltimore, Md.: Johns Hopkins Univ. Press, 1982.

Maddison, Angus, *Monitoring the World Economy. 1820-1992*, Paris: OECD, 1995.

Millar, James R. *et al.*, "Evaluation of the CIA's Analysis of Soviet Economic Performance, 1970-1990", *Comparative Economic Studies*, Summer 1993, ~ (2), 33-58.

Noren, James, "The Controversy over Western Measures of Soviet Defense Expenditures", *Post-Soviet Affairs*, July-September 1995, il (3), 238-266.

Noren, James and Kurtzweg, Laurie, "The Soviet Economy Unravels: 1985-91", in Joint Economic Committee, U.S. Congress, *The Former Soviet Union in Transition*, Vol. 1, D.C.: GPO, 1993.

OECD, *Purchasing Power Parities and Real Expenditures, EKS Results*, Vol. 1, Paris: OECD, 1992.

Schroeder [Greenslade], "Consumption in the USSR and the USA: A Western Perspec-

tive", (processed), 1990.

Schroeder, Gertrude E., "Reflections on Economic Sovietology", *Post-Soviet Affairs*, July-September 1995, II (3), 197-234.

Schroeder, Gertrude and Edwards, Imogene, Consumption in the USSR: An International Comparison, prepared for the Joint Economic Committee, United States Congress, D.C.: GPO, 1981.

United Nations Statistical Commission *et al.*, *International Comparison of Gross Domestic Product in Europe. 1990*, New York: United Nations, 1994.